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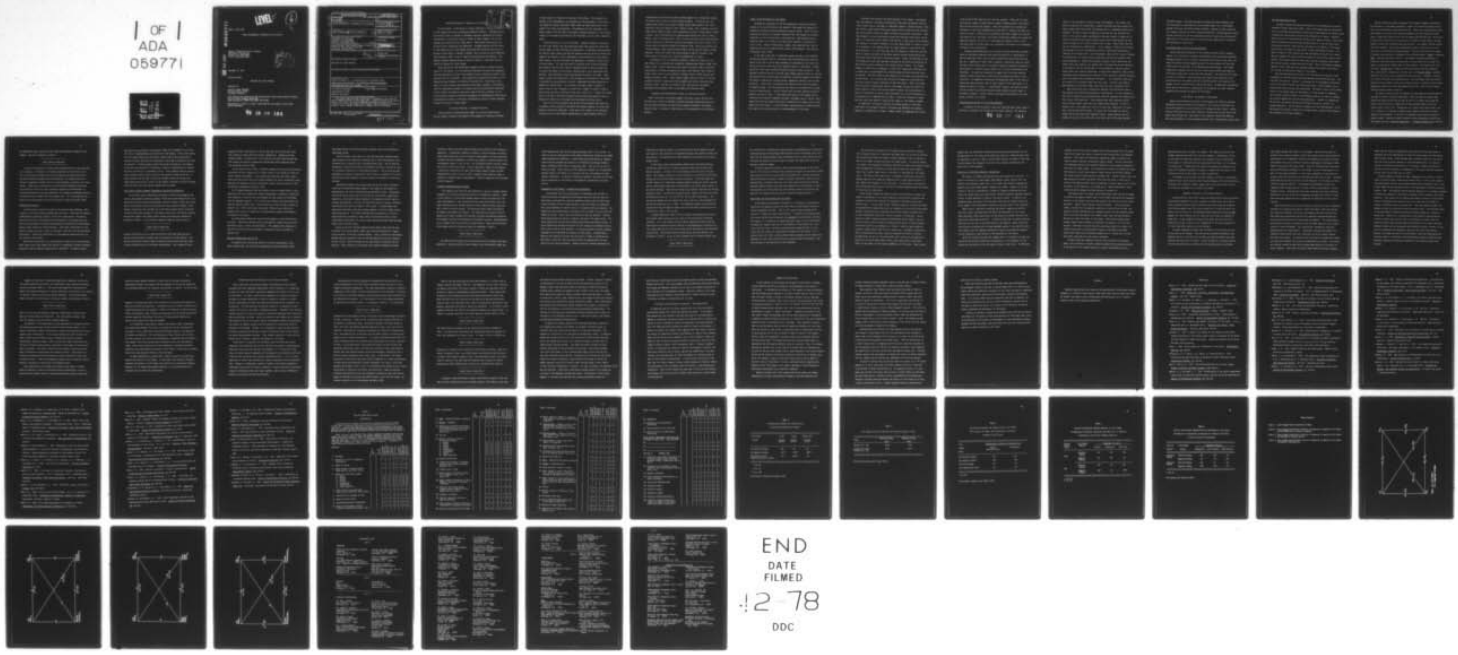

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Recent Developments in Research on Life Stress

James H. Johnson and Irwin G. Sarason
Department of Psychology
University of Washington
Seattle, Washington 98195

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Technical Report

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The present paper provides an overview of a program of life stress research conducted during the past three years. Findings related to the assessment of life stress, the role of moderator variables, and the issue of causality in life stress research are reviewed. Major conceptual and methodological issues related to this area of research are also considered.

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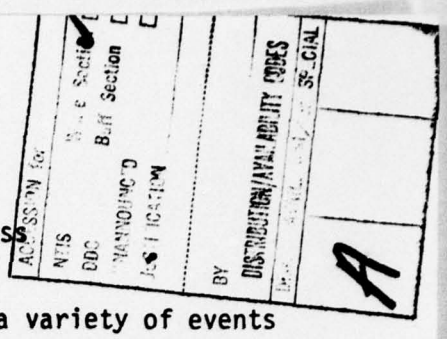

Recent Developments in Research on Life Stress

All individuals, in the course of living, experience a variety of events or life changes which may be considered potential stressors. Included here are such diverse events as changes in residence, marriage, separation and divorce, new additions to the family, death or illness of family members, loss of job, changed work responsibilities, among others. These events often require significant social readjustment and adaptation. Although experiencing high levels of life change may be to some degree correlated with variables such as socio-economic status (Myers, Lindenthal & Pepper, 1974) and minority group membership (Gad & Johnson, 1978), no one is immune from experiencing such changes. Life changes represent ongoing sources of stress to which all individuals are subjected to a greater or lesser degree.

Given the physical and psychological demands involved in coping with high levels of life change, it is not surprising that many clinicians have suggested that the experiencing of major life changes can have a deleterious effect on the functioning of the individual. While speculation concerning the effects of life change has been prominent in the medical and psychiatric literature for many years it is only recently that researchers have begun systematic investigations into the relationships between life stress, health and psychological adjustment. In this chapter we present an overview of some of the early findings of life stress research, discuss the nature of conceptual and methodological difficulties associated with studies in this area, and describe a series of studies designed to deal with certain of these issues.

Life Stress Research: A Selective Overview

The publication by Holmes and Rahe (1967) of an article describing an initial attempt to quantify the impact of life changes on individuals provided

a major impetus for research in the area of life stress. This research culminated in the development of an instrument for the assessment of life stress, the Schedule of Recent Experiences (SRE), which has been widely used in subsequent life stress investigations. The popularity of this instrument is no doubt related to the fact that it provided a convenient measure of, not only the extent of life changes experienced by the individual, but also their cumulative impact.

The SRE consists of a list of 42 events. Subjects respond by indicating, for each item, whether they have experienced that event during the recent past and the number of times the event was experienced. To determine scoring weights for specific events Holmes and Rahe had subjects rate each of the 42 events with regard to the amount of social readjustment living through the various events would require. The item "marriage" was employed as a standard or anchor point in these ratings. This item was given an arbitrary value of 500 and subjects were asked to rate the other items by assigning values of above or below 500 to reflect the degree to which events required more or less readjustment than marriage. Mean adjustment ratings were obtained for each of the items. These values, termed "Life Change Units", when divided by the constant 10, were taken to represent the average amount of social readjustment considered necessary in response to the SRE events. To illustrate, the event "Death of spouse" is given a value of 100, "Pregnancy" a value of 40, "Change in financial state" a value of 38, and "Minor violations of the law" a value of 11. A total life stress score for the SRE is obtained by determining the events experienced by the respondent and summing the life change units associated with these events.

Since its initial development the SRE and similar measures have been used in numerous studies designed to determine relationships between life stress and indices of health and adjustment. While many of the studies in the published literature are less than elegant methodologically, taken together results of

retrospective and prospective studies provide support for a relationship between life stress and a variety of health related variables. Life stress has, for example, been found to be related to sudden cardiac death (Rahe & Lind, 1971), myocardial infarction (Edwards, 1971; Theorell & Rahe, 1971), pregnancy and birth complications (Gorsuch & Key, 1974), seriousness of chronic illness (Wyler, Masuda & Holmes, 1971), the displaying of symptoms among persons with chronic illness (Bedell, Amour, Tavormina & Boll, 1977), as well as to other major health problems such as tuberculosis, multiple sclerosis, and diabetes and a host of other less serious physical conditions (Rabkin & Struening, 1976). While not providing conclusive evidence, these studies provide support for the position taken by Holmes and Masuda (1974) that rather than being related to specific disorders, life stress serves to increase one's overall susceptibility to illness.

In addition to its relationship to physical illness life stress has also been found to be correlated with psychiatric symptomatology (Dekker & Webb, 1974; Paykel, 1974). Several researchers have found life stress scores to correlate with measures of anxiety and depression (Lauer, 1973; Reavley, 1974; Vinokur & Selzer, 1975) as well as with indices of academic (Harris, 1972) and work performance (Carranza, 1972). These findings suggest that life stress is not only related to physical illness but to mental health and levels of personal effectiveness as well. Reviews of the work in this area have been provided by Dohrenwend and Dohrenwend (1974, a) and Rabkin and Struening (1976).

Conceptual and Methodological Issues in Life Stress Research

While significant correlations between life stress scores, derived from the SRE, and a variety of dependent variables have been demonstrated there are many unanswered questions and significant unresolved conceptual and methodological issues. A variety of these issues will be considered in the following sections.

Issues in the Assessment of Life Change

Although the development of the SRE represented a valuable pioneering attempt at the quantification of the impact of life change its adequacy as a psychometric measure has been questioned on several counts. First, its construction was based on the general assumption that life changes are stressful regardless of their desirability or undesirability. Both desirable and undesirable events are included in the SRE and are combined in deriving life stress scores. Several investigators, however, have questioned the logic of combining positive and negative events (Brown, 1974; Mechanic, 1975; Sarason, De Monchaux & Hunt, 1975).

It has been argued that 1) undesirable events may have a very different, and more detrimental effect on individuals than the experiencing of positive events and 2) that it may be more reasonable to conceptualize life stress primarily in terms of events that exert negative impacts on individuals. Vinokur and Selzer (1975) have provided information bearing on these two points. They employed a modified version of the SRE which yielded separate values for positive and negative events and were able to determine correlations between life changes and indices of depression, anxiety-tension, aggression, paranoia, and suicidal proclivity. Significant relationships were found only when using the measure of negative change. Positive change was not found to be systematically related to any of these measures. Similar findings have also been reported by Mueller, Edwards, and Yarvis (1977). To the extent that positive life changes are uncorrelated with important dependent variables instruments such as the SRE, which combine desirable and undesirable events in computing life change scores, would appear less than optimal. It would therefore seem necessary to assess desirable and undesirable change separately in the measurement of life stress.

A related issue concerns the quantification of life changes. Individuals vary considerably in how they are affected by life events and whether they perceive a given event as desirable or undesirable (Mueller, Edwards & Yarvis, 1977). As a result, values derived from group ratings (such as those used with the SRE) may not accurately reflect the impact of events on particular individuals. Problems inherent in using group derived values with individual cases become obvious when it is noted that events listed in the SRE are, in many cases, quite ambiguous. For instance, if a subject responds to the item "Major change in financial status", it is uncertain if the response refers to a major change in a positive or negative direction. It is not clear that the life change unit associated with this event is equally applicable to the person who has recently become bankrupt and the person who has inherited a large sum of money. Indeed, the magnitude of the life change unit itself may have been influenced by the differing perceptions of this event by persons involved in the initial rating of events. As a further example, an event such as pregnancy is likely to be viewed quite differently by a sixteen year old unwed female and a married woman childless during ten years of marriage. The event might be quite negative for the former and quite positive for the latter. It is unlikely that the one life change unit associated with this event would be equally applicable to both individuals. While life change units do provide a quantitative index of life change they may not reflect the actual amount of stress resulting from specific events, due to ambiguities inherent in the SRE and to the fact that individuals vary in their perceptions of the desirability or undesirability of events. Given this limitation it would seem that some other method of assessing the impact of life change is needed.

An additional criticism of existing life change measures is that many items which are considered stressful life events may themselves be viewed as symptoms or consequences of illness. Hudgens (1974) has suggested that as many

as 29 of the 42 SRE items may fall into this category. Items such as sexual difficulties, change in eating habits, change in sleeping habits, and trouble with the boss are obvious examples. While this possibility of confounding represents a significant methodological issue there is evidence that when this source of error is controlled (by considering only events judged to be outside the control of the individual) significant relationships between life change and dependent measures are still to be found (Mueller, Edwards & Yarvis, 1977). This would seem to provide support for considering life events as an independent variable in this relationship.

Although acknowledging that the inclusion of events which may be brought about by individuals themselves may create difficulties in interpretation it may be argued that events such as sexual difficulties, being fired from ones job, etc., regardless of their cause, represent a significant source of stress and that to not consider them is to neglect important assessment information if ones purpose is to determine major sources of life stress experienced by the individual. It would seem reasonable to suggest that life stress measures probably should include events, both within and outside the control of the individual. As suggested by Dohrenwend and Dohrenwend (1974, b) this type of measure may have advantages when the major purpose of the investigator is to predict the onset of illness. It would appear, however, that these two types of events should be considered separately when conducting certain types of etiological research. Further studies investigating correlates of both categories of events are in order.

Interpreting the Results of Life Stress Research

In addition to the assessment issues just discussed other factors make it difficult to interpret the findings of life stress research. One important

factor is the retrospective nature of many investigations. For example, how does one interpret the finding that a sample of patients who have recently had heart attacks report more recent life changes than do a comparable group of non-patients? Although it might be tempting to conclude that the increased life stress in the cardiac sample contributed to the heart attacks it might just as easily be concluded that cardiac patients simply report experiencing more past events, perhaps due to a need to justify their illness. Brown (1972) describes this as "retrospective contamination". If for example, a study of the relationship between life stress and depression yields a significant relationship between the two variables what is to be concluded? Again, while it may be tempting to conclude that life stress leads to depression one must also consider alternative explanations. Depressed individuals, becasue of their mood state, may simply recall more negative life changes than individuals who are not depressed. If required to rate the stressfulness of events themselves, they may give reported events more negative weightings. An additional explanation might be that individuals who are depressed may, because of their condition, actually experience more life changes than non-depressed individuals. Thus, depression might cause an increase in life changes rather than vice versa. A similar case might be made regarding correlations between life stress and other variables as well.

Some studies have taken a prospective approach, thus eliminating some of the problems associated with retrospective investigations. An early example of this type of research was provided by Rahe (1969) who obtained life change scores from a total of 88 physicians. These subjects were then contacted 9 months later and their health status over the 9 month period assessed. Of the 41 subjects with a life change unit score of at least 250, twenty-four, or 49 per cent, reported some health change. Of the 32 with life change unit scores between 150 and 250 eight (25%) reported illness. Eleven subjects had life change unit scores of less than 150. Only 9 per cent of this group reported

any health change. Many other prospective studies have been conducted, and like retrospective investigations, have provided support for a relationship between life stress and health related variables. Results of these studies do not, however, allow one to infer a causal relationship. Even prospective studies are not sufficient to rule out the possible action of some third variable which might result in both high levels of life stress and lowered levels of physical and psychological functioning.

On the Magnitude of Life Stress Relationships

While significant correlates of life stress have been found in numerous studies it is instructive to examine the magnitude of the correlations obtained. Although exceptions are to be found, correlation coefficients in the .20 to .30 range are usually reported, suggesting that life stress accounts for less than 10 per cent of the variance in the dependent measures employed. This rather sobering fact suggests that our ability to make accurate predictions based on life stress scores alone is much less than desirable. The reason for this state of affairs is unclear. Low correlations may simply reflect problems in the quantification of life events, failure to separate positive and negative life changes, and the unreliability of life stress scales. An additional contributing factor may be the failure of investigators to incorporate into their research variables which mediate the effects of life stress.

Life Stress: An Approach to Assessment

Based on the preceding discussion it would appear that there are numerous unanswered questions related to the effects of life stress on individuals and to the most appropriate way of assessing life changes and their impact. During the past three years we have been involved in research dealing with some of the major issues raised here. One aspect of this research involved the construction and development of a new assessment measure, The Life Experiences Survey (LES).

The Life Experiences Survey

Two major features distinguish the measure to be considered here from the Schedule of Recent Experiences (SRE). First, the present scale was constructed so as to allow for the derivation of both positive and negative life change scores by obtaining individualized ratings of the desirability of events. Secondly, the LES provides for individualized ratings of the impact of events. Such values were considered preferable to group derived values as it was felt that these ratings would provide a more accurate indication of the impact of life changes on particular individuals who may differ in their perceptions of events. Evidence in support of this approach has been provided by the results of a recent study by Yamamoto and Kinney (1976) who found life stress scores, based on self ratings, to be better predictors than scores derived by employing mean adjustment ratings similar to those used with the SRE. Other investigators (Lundberg, Theorell & Lind, 1975) have also provided evidence that supports the value of self ratings in assessing the impact of life events.

The Life Experiences Survey (LES), a 57 item self-report measure, allows respondents to indicate events they have experienced during the past year. The scale has two portions: Section I is designed for all respondents and contains a list of 47 specific events plus three blank spaces in which subjects can indicate other events they may have experienced. The events listed in this section refer to life changes common to individuals in a wide variety of situations. The 10 events listed in Section II are designed primarily for use with students, but could be adapted for use with other populations. Section I is appropriate for use with the general population while both sections are relevant to a student population. (In our research, responses to items from Sections I and II were typically combined in deriving life change scores as much of this research was conducted with college students.)

The LES items were chosen to represent life changes frequently experienced by individuals in the general population. Many of the items were based on existing life stress measures, particularly the SRE. Others were included because they were judged to be events which occurred frequently and which potentially might exert a significant impact on the lives of persons experiencing them. Thirty-four of the events listed in the LES are similar in content to those found in the SRE. However, certain SRE items were made more specific. For example, the SRE contains the item "Pregnancy" which might be endorsed by women but perhaps not by a man whose wife or girlfriend has become pregnant. The LES allows both men and women to endorse the occurrence of pregnancy in the following manner: Female: Pregnancy; Male: Wife's/girlfriend's pregnancy. The Schedule of Recent Experiences includes the item "Wife begins or stops work", an item which fails to assess the impact on women whose husbands begin or cease working. The present scale lists two items: Married male: Change in wife's work outside the home (beginning work, ceasing work, changing to a new job, etc.), and Married female: Change in husband's work (loss of job, beginning of a new job, etc.). Examples of events not listed in the SRE but included here are: male and female items dealing with abortion and more general items such as serious injury or illness of close friend, engagement, breaking up with boyfriend/girlfriend, etc. Nine of the 10 school related items are unique to the LES.

The format of the LES calls for subjects to rate separately the desirability and impact of events they have experienced. They are asked to indicate those events experienced during the past year as well as 1) whether they viewed the event as being positive or negative and 2) the perceived impact of the particular event on their life. Ratings are on a 7 point scale ranging from -3 to +3. A rating of -3 indicates a negative event judged to have had an extreme impact on the respondent. A rating of +3 indicates a positive event having an extreme impact. Summing the impact ratings of events designated as positive by the subject provides a positive change score. A negative change score is derived

by summing the impact ratings of those events experienced as negative by the subject. The LES is presented in Table 1.

Insert Table 1 about here

To date a large amount of data has been collected bearing on the usefulness of this measure. Information is available regarding the reliability of the LES, the relationship between LES scores and measures of social desirability, and the relationship between positive and negative life change scores and a variety of dependent variables similar to those employed in previous life stress studies. These latter correlations, not only provide information concerning the validity of the LES but also information regarding the differential relationship between desirable and undesirable life changes and dependent measures. An overview of this research will be presented here. For a more detailed discussion of the development of the LES see Sarason, Johnson and Siegel (1978).

Reliability of the LES

Two test-retest reliability studies of the LES have been conducted. Both involved a 5 to 6 week interval between test and retest. There were 34 subjects (undergraduate psychology students) in the first study and 58 in the second. The LES was scored to yield both positive and negative life change scores and Pearson product-moment correlations were employed to determine the relationships between scores obtained at the two testings. Test-retest correlations for the positive change score were .19 and .53 ($p < .001$) in the first and second studies, respectively. Reliability coefficients for the negative change score were .56 ($p < .001$) and .88 ($p < .001$).

While these correlations vary to some extent, perhaps due to the relatively small sample sizes, they suggest that the LES is a moderately reliable instrument especially when the negative change score is considered. It should be noted

that test-retest reliability coefficients found with instruments of this type are likely to underestimate the reliability of the measure. With a time interval of 5 to 6 weeks between test and retest, subjects may actually experience a variety of events, both positive and negative, which may be reported at the time of retesting. As these changes reflect the actual occurrence of life changes, rather than inconsistencies in reporting, it would be inappropriate to consider the total variability in responding as error. Since subjects generally seem to report somewhat higher levels of positive than negative change on the LES, it seems possible that the lower reliability estimates found with the positive change measure may be due, in part, to the greater likelihood of positive changes occurring within the time interval between test and retest.

Life Stress, Anxiety, Academic Performance, and Social Desirability

In an initial study investigating correlates of positive and negative LES scores, undergraduate psychology students (N=100) were administered the LES, the State-Trait Anxiety Inventory (Spielberger, Gorsuch & Lushene, 1970), and a short form of the Marlowe-Crowne Social Desirability Scale (Strahan & Garbasi, 1972). Academic transcripts were available for 75 of these students making it possible to derive grade point averages for the quarter during which the testing occurred. Correlations between life change scores, anxiety and grade point average are presented in Table 2. As can be seen, negative change was found to be cor-

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Insert Table 2 about here

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related significantly and in a positive direction with both state and trait anxiety while the positive change score was unrelated to either measure. Significant correlations between negative change and anxiety have also been found in data collected as part of two other investigations. For a sample of naval

personnel (N=76), correlations of .46 ($p < .001$) and .40 ($p < .001$) were found with measures of state and trait anxiety, respectively. Employing college students (N=82), a correlation of .24 ($< .05$) has also been found between negative change and anxiety as measured by the Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965).

As can also be seen in Table 2, negative change was found to be significantly correlated with GPA, suggesting that higher levels of life change are related to poorer academic performance. These results are consistent with other studies which have found significant relationships between life stress (assessed by other measures) and measures of anxiety (Constantini, Braun, Davis & Iervolino, 1973) and academic achievement (Carranza, 1972).

As it seemed reasonable that the effects of positive change might, in part, ameliorate the stress produced by negative experiences, a balance or subtractive score (negative - positive) was also computed for each subject and correlated with the dependent measures. In no case was this balance score more predictive than the negative change score. These results are similar to those reported by Mueller et al. (1977), and Vinokur and Selzer (1975) who have found such a balance score to be less predictive of stress-related variables than measures of negative life change.

No relationship between LES scores and the measure of social desirability was found. Correlations between positive and negative change scores and social desirability were -.05 and .05 respectively. This suggests that responses to the LES are unlikely to be signigicantly influenced by social desirability response bias.

Personal Maladjustment and the LES

To determine the relationship between life stress and measures of personal maladjustment, the LES and the Psychological Screening Inventory (PSI)

were administered to 75 male and female volunteers drawn from introductory psychology courses.

The PSI (Lanyon, 1970; 1973) is a 130 item true-false inventory which yields scores on five subscales; Alienation (Al), Social Nonconformity (Sn), Discomfort (Di), Expression (Ex), and Defensiveness (De). The Al scale was designed for "assessing similarity to psychiatric patients", and the Sn scale for "assessing similarity to incarcerated prisoners". The Di scale has been presented as a measure of neuroticism, the Ex scale as a measure of the introversion-extraversion dimension, and the De scale as a measure of test taking attitude.

Correlations between life change scores and the PSI scales indicated a significant relationship between negative life change and two measures of maladjustment; the Social Nonconformity and Discomfort scales. Correlations with the Sn and Di scales were .20 ($p < .05$) and .23 ($p < .05$), respectively, suggesting a relationship between negative life change and certain types of personal maladjustment. Only the PSI Expression scale was found to correlate significantly with positive change ($r=.28$; $p < .02$). It would appear that extraverted individuals experience greater degrees of positive change than do introverted persons. The results obtained here are generally in line with those obtained by Constantini, Braun, Davis and Iervolino (1973) in their investigation correlating life stress scores, derived from the Holmes and Rahe (1967) scale, with PSI scores.

Scores on the LES, the Beck Depression Scale (Beck, 1967) and the Locus of Control (I-E) Scale (Rotter, 1966), have also been obtained for a sample of 64 (34 males, 30 females) college students. Here a significant relationship between negative change and scores on the Beck Depression scale was obtained ($r=.24$; $p < .05$). Positive change was not significantly correlated with depression. These findings are consistent with evidence presented by Vinokur

and Selzer (1975), who found negative change to be related to self ratings of depression. An additional finding of interest is that individuals who report having experienced high levels of negative change appear to be more externally oriented, perceiving themselves as being less capable of exerting control over environmental events ($r=.32$; $p<.01$). No relationship between positive change and locus of control was found. Finally, employing a sample of 122 subjects, a significant relationship has been found between negative change and MMPI Hypochondriasis scores ($r=.38$; $p<.001$), suggesting that negative change is related to increased somatic preoccupation. Positive change was not correlated with this measure.

A Study of Counseling Center Clients

Life change scores have also been obtained on a group of students seeking treatment at a University Counseling Center for psychological problems. Based on the finding of a relationship between negative change and measures of personal maladjustment, it was expected that this group would differ from a randomly selected group of college students in their negative change scores but not in terms of positive change. The Counseling Center sample consisted of 18 students (16 females and 2 males). For comparison LES records of 18 (16 females and 2 males) students were selected at random from protocols obtained from students enrolled in Introduction to Personality courses. (Undergraduates at all academic levels are enrolled in these courses.) Mean positive and negative change scores for these two groups are presented in Table 3.

Insert Table 3 about here

No significant differences were obtained when positive change scores were considered. Counseling Center clients, however, had significantly higher neg-

ative change scores than did the comparison group, t (34) = 2.21, $p < .05$. In order to rule out the possibility that these findings were unique to the random sample selected for comparison, a second comparison group (N=18) was randomly drawn from the completed LES protocols of Introductory Psychology students. Again, differences were found for negative, t (34) = 2.89, $p < .01$, but not for positive change. These findings provide additional support for a relationship between negative life change, as assessed by the LES, and problems of psychological adjustment. It should be pointed out, however, that data of this type may be susceptible to the problem of retrospective contamination discussed earlier.

Assessment of Life Change: A Comparison of Approaches

To the extent that the LES represents an improvement over the SRE, it should be possible to demonstrate that measures derived from this scale are more highly correlated with relevant dependent variables than are SRE scores. Further analyses of data already reported, along with analyses of additional data, were undertaken to provide a basis for comparing these two measures. The comparisons were accomplished by scoring only the 34 items of the LES which are common to the SRE. These items were scored to yield four measures. Three of these measures were LES positive, negative, and total life change scores. The total change score was derived by summing the positive and negative scores. A fourth measure was derived by applying the life change units employed with the SRE to each of the 34 items reported. It was thus possible to derive a measure comparable to the SRE based on responses to these events. Although these measures were based on 34 rather than the entire 42 items of the Holmes and Rahe scale, it was felt that they would provide an adequate basis for comparing the two scoring procedures. Based on previous findings regarding the

importance of negative change it was predicted that the LES negative change score would be more predictive of dependent measures than would the Holmes and Rahe measure. No predictions were made regarding the LES positive and total change scores.

In one study, female undergraduates (N=69) drawn from Human Sexuality courses were given the LES, the Beck Depression Scale and the State-Trait Anxiety Inventory. The four life change measures were derived as outlined above. One somewhat surprising finding was that of no significant correlation between any of the life change measures and anxiety. Given the rather consistent finding of a relationship between negative change and anxiety reported earlier these results might best be attributed to the rather select nature of the sample employed. Significant findings were, however, obtained with the Beck Depression Scale. Correlations between positive, negative and total LES scores and depression were .02, .37 ($p < .01$) and .24 ($p < .05$), respectively. The correlation between the life change unit score, similar to that employed with the SRE and depression was .17 (NS). The difference between the correlations obtained with the LES negative change score and the Holmes and Rahe score was significant; $\underline{t}$ (66) = 2.31; $p < .05$.

A second comparative study of the LES and SRE investigated the relationship between these measures and the scores on the Psychological Screening Inventory. As in the original analysis (which employed the entire LES) two Psychological Screening Inventory measures of psychopathology correlated with life change when only 34 items were scored; Social Nonconformity and Discomfort (neuroticism). Correlations between change scores and these measures are presented in Table 4. As can be seen, although the LES negative change score

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Insert Table 4 about here

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was significantly correlated with both measures of maladjustment no significant relationships were found between these measures and the life change unit score. While the differences between these correlations did not reach statistical significance the pattern of results seems to support the superiority of the LES measure of negative change.

A further comparative study of the LES and SRE approaches to the assessment of life stress has recently been reported by Pancheri and De Martino (1978). They found LES scores to be more highly associated with a variety of physical (gastro-intestinal disorders, allergic disorders, myocardial infarction, etc.) and psychiatric disorders than were life stress scores derived from the SRE. Although negative change scores were most predictive in the majority of cases, these authors raise the possibility that different patterns of positive and negative life change scores may relate to specific disease entities.

Mood States and the Reporting of Life Change

In developing an assessment instrument it is necessary to provide data indicating that measures derived from the scale are significantly related to relevant dependent variables. Data of this type has been provided by the results of a number of studies reported here. It should also be demonstrated that scores derived from the measure are unrelated to certain other variables. For example, it is necessary to demonstrate that scores are not significantly influenced by response sets such as the tendency to place oneself in a socially desirable light. Earlier we presented data suggesting that it is unlikely that LES scores are significantly influenced by this factor. It is possible that still other variables might affect responding to the extent that estimates of life stress derived from this measure would be inaccurate. One such variable is the mood state of the respondent.

As LES positive and negative life change scores are based on subjects' self ratings of events it is possible that mood state, at the time of testing, may significantly affect the number of events reported as well as the desirability and impact ratings associated with these events. It could be argued, for example, that depressed individuals might tend to report more negative events than non-depressed individuals and that they may also give these negative events more extreme impact ratings resulting in a high negative life change score. This type of bias might result in finding a significant correlation between negative life change and depression such as that reported earlier in this chapter and elsewhere in the literature. If such factors are operative this relationship would be more reflective of biased responding than the effects of life stress on individuals.

While further studies are needed to assess the influence of subject variables on responding to life stress measures, one preliminary study has been conducted to specifically examine the possibility that mood state may be a biasing factor. In this study (Siegel, Johnson & Sarason, in press) the effect of experimentally induced mood states on responding to the LES was investigated. Subjects who had previously completed the LES were randomly assigned to one of three experimental conditions; neutral, elation, or depression. By employing an affect induction procedure developed by Velten (1968) it was possible to induce transient states of depression and elation in these subjects. The neutral condition was employed as a control. After the mood induction procedure subjects were given the LES a second time. Although a manipulation check indicated that the affect induction procedure did result in elation and depression (as well as increased anxiety and hostility in the depression condition) in the two experimental groups, mood states had no significant effect in the number of life changes reported or on LES scores. These results

suggest that the significant correlations previously obtained between the LES and depression are not likely to be simply the result of a depressed mood state on responding to the LES. Again, while further research is needed in this area, it would appear that responses to the LES are not unduly influenced by the mood state of the respondent.

The LES as a Life Stress Measure: An Overview

The results of studies reported here are quite supportive of the LES. In terms of reliability it would appear that negative scores, derived from this measure, are reasonably stable over a 5 to 6 week time interval, although the measure of positive change appears somewhat less stable. Support for the usefulness of the LES is provided by a variety of findings indicating that negative life change scores are significantly related to numerous dependent measures similar to those employed in previous life stress studies. In addition, LES responses appear relatively free from social desirability response biases and do not appear to be significantly affected by the mood state of the respondent.

Other results, obtained by ourselves and others, suggest that the LES possesses certain advantages over the SRE in the assessment of life stress. These advantages relate particularly to the distinction between desirable and undesirable change made by the LES. It might be noted that in studies reported here there was no case in which both positive and negative change scores were significantly correlated with the same dependent measure in the same direction. This suggests that the separate assessment of positive and negative change by the LES represents a step forward in the assessment of life stress.

While the findings reported here suggest that it is essential to take into account the desirability-undesirability dimension in the assessment of life stress the contribution of the LES impact ratings is less clear. In additional

analyses of data from studies reported here we have compared LES life change scores with simple unit scores in terms of their correlations with dependent measures. Unit scores were derived by summing the number of positive and negative events reported, disregarding impact ratings. Similar correlations with dependent measures were obtained regardless of the procedure employed in deriving life change scores. Unit scores were as highly correlated with dependent measures as were scores based on impact ratings (correlations between LES scores and unit scores generally exceeded .80). Similar findings have also been obtained by Vinokur and Selzer (1975) who have found a simple sum of positive and negative events to be as predictive as scores based on self ratings of events, or the summing of life change units. These investigators found intercorrelations between the three measures to exceed .90.

Considering that life change scores obtained by simply summing the number of positive and negative events seem to be as highly correlated with dependent measures as LES change scores one might question the need for the self rating procedure. Indeed, these findings, along with those of Vinokur and Selzer (1975), indicate that the apparent superiority of the LES over the SRE, suggested by studies reported earlier, probably results from the separate assessment of positive and negative life changes rather than from the procedures employed to assess the impact of life events. While these findings would perhaps suggest that the method of weighting life events is of little consequence, intuitively it would seem that some events (death of a spouse, for example) might have a more detrimental impact on individuals than other events which might also be considered negative (e.g., trouble with in-laws) and should accordingly be given greater weighting.

As Rahe (1974) has suggested it may be that the method of weighting makes little difference in studies employing subjects who experience moderate to low levels of life change and who, as a group, have generally not ex-

perienced high levels of major life changes. The samples involved in the studies reported here would fall into this category. Differential ratings of the impact of events may, however, be of greater value in quantifying life changes in individuals who have experienced high levels of life changes of a major sort. Further empirical studies are necessary to determine the value of differential weighting procedures in general and the value of individualized ratings of the impact of events in particular.

In summary, it may be concluded that although a variety of researchable questions remain to be answered concerning the adequacy of the LES, preliminary findings from a number of studies suggest that it may prove to be of value as a research instrument for assessing life change.

Moderator Variables in Life Stress Research

As noted earlier, while many studies have found statistically significant relationships between life stress, assessed in various ways, and a host of stress-related variables these correlations have usually been quite modest. This finding suggests that life stress accounts for a relatively small proportion of the variance in the dependent measures employed and that by themselves life stress measures are not likely to be of value for purposes of prediction. It was suggested previously that while this poor ability to predict may be due, in part, to the inadequacies of life stress measures it is likely that other factors are also involved.

It seems reasonable to assume that the effects of life stress may not be the same for all persons. Some persons may be greatly affected by even moderate levels of life stress while others may show few effects even when experiencing high levels of change. A major limitation of research studies in this area seems to be a relative lack of attention given to variables

which might mediate the effects of life change. While there has been relatively little research related to this issue several writers have pointed to the possible role of moderator variables in determining the precise relationship between life stress and other variables (Dohrenwend & Dohrenwend, 1974b; Rabkin & Struening, 1975; Rahe, 1978). Given the likelihood that individuals may be differentially affected by life change, it may be unreasonable to expect to find strong correlates of life stress, regardless of the measure employed, unless such variables are determined and taken into account. Increased predictability may only be achieved as the mediators of life stress are identified and measured reliably. As Dohrenwend and Dohrenwend (1975b) have suggested these variables may be of either a social, psychological, or physiological nature. Although there have been relatively few studies designed specifically to look at the role of moderator variables the results of those which have been conducted serve to emphasize the importance of this line of research.

One of the earliest life stress studies to consider the role of moderator variables was conducted by Nuckolls, Cassell and Kaplan (1972) who examined the relationship between life stress and pregnancy and birth complications. Here women were administered the SRE and a specially designed Psychosocial Assets Scale during the thirty-second week of pregnancy. The latter measure was designed to assess the degree to which the women possessed social support systems in their environment. Also obtained was information concerning pregnancy and birth complications. Significant relationships between life change and complications were only found when the social supports measure was taken into account. For subjects with high levels of psychosocial assets, no relationship between life stress and complications was found. Life stress was, however related to complications among those women with low levels of social supports. Given high life stress scores before and during pregnancy,

women with low levels of psychosocial assets had three times the number of pregnancy and birth complications of high life stress women with high psychosocial assets scores. These findings seem to provide support for the notion that the level of social supports in ones environment may be an important variable in determining the effects of life stress. Recent discussions of the role of social supports as a moderator of life stress have been presented by Cobb (1977) and by Dean and Lin (1977).

Another moderator variable has been suggested by the results of a recent study conducted by Smith, Johnson and Sarason (1978). In this study subjects were administered the LES, the Sensation Seeking Scale (Zuckerman, Kolin, Price & Zoob, 1964) and the Discomfort Scale of the Psychological Screening Inventory (Lanyon, 1973). The Sensation Seeking measure employed is an instrument designed to assess the tendency of individuals to engage in thrill seeking, risk taking behaviors. High scorers on this measure are thought to display a high optimal level of stimulation while those scoring low on the scale are thought to display a low optimal level of stimulation. Thus, low sensation seekers are thought to often try to minimize arousing stimulus input. The Discomfort Scale of the Psychological Screening Inventory has been presented as a measure of neuroticism. Smith et al., reasoned that if the Sensation Seeking measure, in fact, reflects one's optimal level of stimulation or arousal that low sensation seekers should be more adversely affected by life stress than high sensation seekers who are presumably more tolerant of change. Results in line with this hypothesis were obtained. While no significant relationships between life change and scores on the Discomfort scale were found among high sensation seekers a significant relationship between negative change and the Discomfort measure was found when responses of low sensation seekers were analyzed.

Support for the role of stimulation seeking as a moderator variable has also been provided by the results of an additional study conducted by Johnson, Sarason and Siegel (1978, a). This study investigated the relationship between life change and measures of anxiety, depression, and hostility as a function of subjects' status on the arousal seeking dimension. Correlations between these variables for both high and low arousal seekers are presented in Table 5.

Insert Table 5 about here

Here it can be seen that negative change was significantly correlated with measures of both anxiety and hostility. This relationship, however, held only for subjects low on the arousal seeking dimension.

The effects of life change may also vary depending on the degree to which the person perceives events as being under his/her personal control. In a recent investigation Johnson and Sarason (in press) have obtained results that support such a relationship. In this study subjects were given the LES, the Rotter (1966) Locus of Control Scale, the State-Trait Anxiety Inventory (Spielberger, Gorsuch & Lushene, 1970), and the Beck (1967) Depression Scale. The Locus of Control scale assesses the subjects' perceptions of control over their environment. Low scorers (internals) are thought to perceive environmental reinforcers as being under their personal control. High scorers (externals) are believed to view reinforcers as being controlled by fate, luck, or powerful others. There is considerable evidence that this measure reflects subjects' perception of control over environmental events.

Since experiencing life changes which persons feel unable to control might be expected to result in increased anxiety and depression, it was expected that the highest levels of anxiety and depression would be found with

high life stress subjects external in their locus of control orientation. Correlations between life change scores and measures of anxiety and depression are presented separately for internals and externals in Table 6. As can be seen,

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Insert Table 6 about here

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negative life change was found to be significantly correlated with measures of both trait anxiety and depression. Consistent with our original prediction this relationship held only for externals. While it is difficult to infer cause and effect relationships, these findings are consistent with the notion that persons are more adversely affected by life stress if they perceive themselves as having little control over their environment.

In an additional study Siegel, Johnson, and Sarason (1978) investigated the relationship between life stress, as assessed by the LES, and menstrual discomfort. Here a significant relationship between negative life change and discomfort was obtained. This relationship was found, however, to hold only for those subjects not taking oral contraceptives, suggesting that the relationship between life stress and menstrual discomfort varies with contraceptive usage. These results again point to the importance of considering possible moderators when investigating correlates of life stress, in this case a variable which exerts physiological effects on the individual.

It seems reasonable to conclude that a number of specific variables may mediate the effects of life changes. To the extent that moderator variables influence the effects of life change, the finding of low correlations between measures of life change and dependent measures is to be expected when such variables are not taken into consideration.

Concerning Causal Relationships in Life Stress Research

While significant correlations between life change and stress-related variables have been repeatedly demonstrated in the literature it is impossible to draw firm cause and effect conclusions regarding the effects of life stress on individuals. In order to make causal statements it is usually considered necessary to conduct experiments in which a variable of interest is systematically manipulated and where the effect of this manipulation on behavior can be observed. For both practical and ethical reasons it is impossible to manipulate life stress as one might a laboratory stressor. Because of this problem, studies relating life stress to indices of health and adjustment have necessarily been correlational in nature. While the results of such studies are of interest, one cannot say whether life stress results in problems of health and adjustment, for example, or whether persons with such problems are simply more prone to experience life changes. Further, it is impossible to rule out the existence of other variables which may have resulted in both high levels of life change and health and adjustment problems. Thus, research reported, to date, does not permit causal inferences regarding the effects of life stress.

Given that it is desirable to ultimately reach the point where causal inferences can be made and that we will continue to be unable to experimentally manipulate life stress how then does one proceed? It is likely that no one study, no matter how well designed, will be capable of providing data sufficient to justify the conclusion that a causal relationship exists. It is, in fact, impossible to "prove" the existence of a causal relationship from correlational data. However, by conducting a variety of studies, specifically designed to investigate and control for specific variables, it may be possible to accumulate a body of information which, when taken together, would allow an inference of causality to be made with some justification.

One potentially fruitful approach to investigating the possibility of a causal relationship in the life stress area would involve the use of a cross-lagged correlational methodology. This quasi-experimental approach, originally suggested by Simon (1954), involves obtaining data on two variables of interest at two points in time and comparing the correlations among these variables from one time period to another. An illustration of this cross-lagged methodology, as applied to life stress research, is presented in Figure 1. As can be seen,

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Insert Figure 1 about here

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correlations can be obtained between life stress scores and dependent variables at Time 1 and Time 2. These are the correlations which might be obtained in the typical correlational study. Correlations between life stress scores at Time 1 and Time 2 and between dependent measures at Time 1 and 2 can also be obtained. These provide information concerning the stability of measures over time. The remaining two correlations are of primary interest in assessing the possibility of a causal relationship. If a causal relationship exists and life stress influences health and adjustment one would expect life stress, assessed at Time 1, to be significantly correlated with indices of health status and adjustment obtained at Time 2, and that this correlation (rLS_1, DV_2) would be greater than that obtained between health and adjustment, assessed at Time 1, and life stress assessed at Time 2 (rDV_1, LS_2). A significant, and larger, correlation of the latter type would be more suggestive of a causal relationship in which health and adjustment influence subsequent life stress. While this approach would appear to be of value in investigating the possibility of a causal relationship it does have limitations, one being that it does not entirely eliminate the possibility that some additional variable may cause the two variables of interest (life stress and health status in this case) to covary. For further discussion of this methodology see Kenny (1975).

Data of the type described here have been obtained in a recent study by Johnson, Sarason and Siegel (1978, b). Here measures of life stress (previous six months) and several self report indices of health and adjustment were obtained on a sample of undergraduate psychology students. Seven months later 42 subjects were contacted and these same measures obtained a second time. While the data from this study has not yet been fully analyzed preliminary analyses seem to be consistent with a causal interpretation, particularly when measures associated with physical health are considered. To illustrate, cross-lagged correlations for three of the dependent measures are present below. In Figure 2 it may be noted that life stress (negative change) scores at Time 1

Insert Figure 2 about here

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are significantly correlated with the reporting of physical symptoms at Time 2. No significant relationship was found between physical symptoms at Time 1 and subsequent life stress scores. In Figure 3 similar findings are

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Insert Figure 3 about here

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presented with regard to self ratings of overall physical health. Again life stress, assessed at Time 1, was significantly correlated with health ratings at Time 2, while health ratings at Time 1 were unrelated to later life stress. Finally, results of the same type were obtained when a measure of somatic preoccupation (MMPI Hypochondriasis scores) was considered (see Figure 4).

Insert Figure 4 about here

In general, these preliminary findings lend tentative support to the view that a causal relationship may exist between negative life change, on one hand,

and certain health related variables on the other. Further, analyses including an examination of the role of events within and outside the control of respondents should shed additional light on the nature of these relationships. Although these findings are suggestive other studies of this type are needed which employ more objective indices of health status and adjustment. It might be noted that a similar study, employing the cross-lagged correlational approach has recently been conducted by Vosser and Froelich (1978). These investigators have examined the relationship between negative life changes, as assessed by the LES, and measures of job tension and task performance effectiveness. The findings of this study were interpreted as being consistent with a causal relationship in the predicted direction (e.g., life stress leads to job tension and decreased performance effectiveness).

In addition to further studies of the type described above, research is also needed which examines the effects of variables considered likely to influence both life stress and indicators of illness and adjustment. One example of a variable of this type would be socioeconomic status. It might be argued that persons who are low in SES may be more likely to experience negative life changes and to also, for a variety of reasons, be more prone to develop health related problems. One might also expect problems of psychological adjustment to be more common to this group. Correlations between life stress and illness in this instance might simply result from the fact that both variables covary with SES. Concerning this variable Gad and Johnson (1978) have recently conducted a study relating life change to several dependent measures reflective of health status and drug usage, using a sample of black and white adolescents as subjects. An index of parental socioeconomic status was also obtained. Significant relationships between negative life change and a variety of the dependent measures were found. Of particular interest here, however, is the fact that even when the variance associated with SES was

partialled out significant correlations between negative change and dependent measures were found. This would suggest that the obtained relationships between life change and dependent variables was not due to the common association of these variables with socioeconomic status. Additional studies of this type, investigating other variables, which might exert a common influence on both life stress and health and adjustment are in order.

Life Stress and Information Processing: Some Speculations

A neglected area of life stress research has to do with the possible relationship between life stress and cognitive variables. To the extent that coping with life stressors may place both physical and psychological demands on individuals and may be related to increased levels of anxiety and arousal as well as problems of health and adjustment, one might speculate that life stress may have a deleterious effect on cognitive performance. A variety of studies, for example, have suggested that high levels of anxiety and arousal are negatively related to performance on complex tasks (Eysenck, 1976), the ability to utilize semantic cues in recall (Mueller, 1976), and degree of cue utilization; aroused individuals displaying a more restricted range of attention (Bacon, 1974; Easterbrook, 1959). Likewise, Broadbent (1971), in considering the effects of specific environmental stressors, has noted that conditions such as noise, high and low temperatures, and sleeplessness also have been shown to affect performance on vigilance tasks as well as other aspects of performance. It would not be surprising to find that high life stress subjects display similar problems of attention, memory and performance as well as perhaps other difficulties in the processing of information. While little research has been done in this area the relationship between life stress and such variables would seem to be a topic worthy of investigation.

Summary and Conclusions

In this chapter we have focused on one type of stress which is assumed to have negative effects on the physical and psychological well-being of individuals. In considering the effects of life changes it should be pointed out that persons may be exposed to a variety of other types of stress as well. Here one might include a variety of ecological stressors such as high population density (crowding), other factors such as "noise pollution" and living in extreme environments. Additionally, it is obvious that there are a variety of other stressors which impinge on the lives of some persons which are not experienced in terms of "recent life events". Examples of stressors of this sort might include the knowledge that one has some probability of developing a genetically related disease or that one, at some earlier time, was industrially exposed to what is now known to be a carcinogen. Other potential stressors such as the realization that one has not reached and probably will not reach goals set earlier in ones career, or that ones level of professional activity is declining may not be fully reflected in terms of specific life changes. Finally, there are undoubtedly a variety of day to day situations which do not bring about major life changes and which do not necessitate social readjustment, but which may nevertheless serve as stressors. Thus, life changes may best be viewed as one of many sources of stress albeit an important one. In spite of the fact that changes such as those assessed in life stress research do not tap the totality of stressful situations to which one is exposed, negative life changes do seem to constitute a major type of stress common to the daily lives of individuals. As such, continued research regarding the effects of such life changes on the health, adjustment, and performance of individuals would appear to be especially important.

Based on previous life stress research and on the results of studies reported here it would seem possible to begin to draw some tentative con-

clusions regarding certain important issues in the area and to comment briefly on future directions in which work in this area might proceed.

Taken together, the findings cited here along with those of Mueller, Edwards, and Yarvis (1977) and Vinokur and Selzer (1975) suggest that life stress may be most accurately conceptualized in terms of events that exert negative impacts on individuals. This view is supported by the results of a variety of studies which indicate that negative but not positive change is significantly related to stress related dependent measures. This position, emphasizing the importance of negative change is at variance with the views of earlier investigators in the area (Holmes & Rahe, 1967) who emphasized the role of change per se as the crucial variable. Again, the evidence to date suggests that if one wishes to obtain measures of life stress the focus should be on the assessment of negative life changes.

Considering the distinction to be made between positive and negative life changes it would appear that the Life Experiences Survey represents a useful step in the assessment of life stress as it allows for the derivation of both positive and negative life change scores. That this measure may be a useful research tool is suggested by the fact that comparisons between the LES and measures similar to the SRE, by ourselves and others, have suggested the superiority of the LES, particularly the negative change score. Although further research with this measure is needed, the results of studies conducted thus far suggest that the LES may have advantages over existing measures.

In spite of the fact that the LES may prove to be useful as a life stress measure it is still likely that life stress measures alone will leave much to be desired in terms of predictibility. As suggested earlier, it is probably the case that life stress does not have a uniform effect on individuals and that there may be a variety of social, psychological and perhaps physiological variables which may mediate the effects of life stress (if in fact a causal relationship exists). Further research related to possible mod-

erators of life stress is greatly needed.

While not minimizing the need to consider other major methodological and conceptual issues in the area, it may be argued that it is time to stop simply looking for additional correlates of life stress and begin to determine under what conditions, and with which individuals, observed relationships hold. It is only by identifying and determining the role of moderator variables and considering such variables within experimental designs that we can begin to assess the actual implications of life change for the health status, adjustment and performance of individuals.

Finally, as research is beginning to determine more precisely the nature and effects of life stress and the characteristics of individuals most likely to be affected by life changes the development of stress management programs designed to help individuals cope more effectively with such stressors would seem to be a major challenge of the future.

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Table 1

The Life Experiences Survey

Instructions

Listed below are a number of events which sometimes bring about change in the lives of those who experience them and which necessitate social readjustment. Please check those events which you have experienced in the recent past and indicate the time period during which you have experienced each event. Be sure that all check marks are directly across from the items they correspond to

Also, for each item checked below, please indicate the extent to which you viewed the event as having either a positive or negative impact on your life at the time the event occurred. That is, indicate the type and extent of impact that the event had. A rating of -3 would indicate an extremely negative impact. A rating of 0 suggests no impact either positive or negative. A rating of +3 would indicate an extremely positive impact.

SECTION I

	0 to 6 mo.	7 mo. to 1 yr.	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
1. Marriage			-3	-2	-1	0	+1	+2	+3
2. Detention in jail or comparable institution			-3	-2	-1	0	+1	+2	+3
3. Death of spouse			-3	-2	-1	0	+1	+2	+3
4. Major change in sleeping habits (much more or much less sleep)			-3	-2	-1	0	+1	+2	+3
5. Death of close family member:									
a. mother			-3	-2	-1	0	+1	+2	+3
b. father			-3	-2	-1	0	+1	+2	+3
c. brother			-3	-2	-1	0	+1	+2	+3
d. sister			-3	-2	-1	0	+1	+2	+3
e. grandmother			-3	-2	-1	0	+1	+2	+3
f. grandfather			-3	-2	-1	0	+1	+2	+3
g. other (specify)			-3	-2	-1	0	+1	+2	+3
6. Major change in eating habits (much more or much less food intake)			-3	-2	-1	0	+1	+2	+3
7. Foreclosure on mortgage or loan			-3	-2	-1	0	+1	+2	+3
8. Death of close friend			-3	-2	-1	0	+1	+2	+3
9. Outstanding personal achievement			-3	-2	-1	0	+1	+2	+3
10. Minor law violations (traffic tickets, disturbing the peace, etc.)			-3	-2	-1	0	+1	+2	+3

Table 1 continued

	0 to 6 mo.	7 mo. to 1 yr.	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
11. Male: Wife/girlfriend's pregnancy			-3	-2	-1	0	+1	+2	+3
12. Female: Pregnancy			-3	-2	-1	0	+1	+2	+3
13. Changed work situation (different work responsibility, major change in working conditions, working hours, etc.)			-3	-2	-1	0	+1	+2	+3
14. New job			-3	-2	-1	0	+1	+2	+3
15. Serious illness or injury of close family member:									
a. father			-3	-2	-1	0	+1	+2	+3
b. mother			-3	-2	-1	0	+1	+2	+3
c. sister			-3	-2	-1	0	+1	+2	+3
d. brother			-3	-2	-1	0	+1	+2	+3
e. grandfather			-3	-2	-1	0	+1	+2	+3
f. grandmother			-3	-2	-1	0	+1	+2	+3
g. spouse			-3	-2	-1	0	+1	+2	+3
h. other (specify)			-3	-2	-1	0	+1	+2	+3
16. Sexual difficulties			-3	-2	-1	0	+1	+2	+3
17. Trouble with employer (in danger of losing job, being suspended, demoted, etc.)			-3	-2	-1	0	+1	+2	+3
18. Trouble with in-laws			-3	-2	-1	0	+1	+2	+3
19. Major change in financial status (a lot better off or a lot worse off)			-3	-2	-1	0	+1	+2	+3
20. Major change in closeness of family members (increased or decreased closeness)			-3	-2	-1	0	+1	+2	+3
21. Gaining a new family member (through birth, adoption, family member moving in, etc.)			-3	-2	-1	0	+1	+2	+3
22. Change of residence			-3	-2	-1	0	+1	+2	+3
23. Marital separation from mate (due to conflict)			-3	-2	-1	0	+1	+2	+3
24. Major change in church activities (increased or decreased attendance)			-3	-2	-1	0	+1	+2	+3
25. Marital reconcilliation with mate			-3	-2	-1	0	+1	+2	+3

Table 1 continued

	0 to 6 mo.	7 mo. to 1 yr.	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
26. Major change in number of arguments with spouse (a lot more or a lot less arguments)			-3	-2	-1	0	+1	+2	+3
27. Married male: Change in wife's work outside the home (beginning work, ceasing work, changing to a new job, etc.)			-3	-2	-1	0	+1	+2	+3
28. Married female: Change in husband's work (loss of job, beginning new job, retirement, etc.)			-3	-2	-1	0	+1	+2	+3
29. Major change in usual type and/or amount of recreation			-3	-2	-1	0	+1	+2	+3
30. Borrowing more than $10,000 (buying home, business, etc.)			-3	-2	-1	0	+1	+2	+3
31. Borrowing less than $10,000 (buying car, TV, getting school loan, etc.)			-3	-2	-1	0	+1	+2	+3
32. Being fired from job			-3	-2	-1	0	+1	+2	+3
33. Male: Wife/girlfriend having abortion			-3	-2	-1	0	+1	+2	+3
34. Female: Having abortion			-3	-2	-1	0	+1	+2	+3
35. Major personal illness or injury			-3	-2	-1	0	+1	+2	+3
36. Major change in social activities, e.g., parties, movies, visiting (increased or decreased participation)			-3	-2	-1	0	+1	+2	+3
37. Major change in living conditions of family (building new home, remodeling, deterioration of home, neighborhood, etc.)			-3	-2	-1	0	+1	+2	+3
38. Divorce			-3	-2	-1	0	+1	+2	+3
39. Serious injury or illness of close friend			-3	-2	-1	0	+1	+2	+3
40. Retirement from work			-3	-2	-1	0	+1	+2	+3
41. Son or daughter leaving home (due to marriage, college, etc.)			-3	-2	-1	0	+1	+2	+3
42. Ending of formal schooling			-3	-2	-1	0	+1	+2	+3
43. Separation from spouse (due to work, travel, etc.)			-3	-2	-1	0	+1	+2	+3

Table 1 continued

	0 to 6 mo.	7 mo. to 1 yr.	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
44. Engagement			-3	-2	-1	0	+1	+2	+3
45. Breaking up with boyfriend/ girlfriend			-3	-2	-1	0	+1	+2	+3
46. Leaving home for the first time			-3	-2	-1	0	+1	+2	+3
47. Reconciliation with boyfriend/ girlfriend			-3	-2	-1	0	+1	+2	+3
Other recent experiences which have had an impact on your life. List and rate.									
48. _____			-3	-2	-1	0	+1	+2	+3
49. _____			-3	-2	-1	0	+1	+2	+3
50. _____			-3	-2	-1	0	+1	+2	+3
SECTION II STUDENT ONLY									
51. Beginning a new school experience at a higher academic level (college, graduate school, professional school, etc.)			-3	-2	-1	0	+1	+2	+3
52. Changing to a new school at same academic level (undergraduate, graduate, etc.)			-3	-2	-1	0	+1	+2	+3
53. Academic probation			-3	-2	-1	0	+1	+2	+3
54. Being dismissed from dormitory or other residence			-3	-2	-1	0	+1	+2	+3
55. Failing an important exam			-3	-2	-1	0	+1	+2	+3
56. Changing a major			-3	-2	-1	0	+1	+2	+3
57. Failing a course			-3	-2	-1	0	+1	+2	+3
58. Dropping a course			-3	-2	-1	0	+1	+2	+3
59. Joining a fraternity/sorority			-3	-2	-1	0	+1	+2	+3
60. Financial problems concerning school (in danger of not having sufficient money to continue)			-3	-2	-1	0	+1	+2	+3

TABLE 2

Correlations Between Life Change Scores,

Anxiety and Academic Achievement

Life Change Scores	Trait Anxiety (N=97)	State Anxiety (N=97)	Grade Point Average (N=73)
LES Positive Change	.04	.03	-.21
LES Negative Change	.29**	.46***	-.38***
LES Balance Score (*Negative-Positive events*)	-.21*	-.36***	.18

* $p < .05$

** $p < .01$

*** $p < .001$

From Sarason, Johnson and Siegel (1978)

TABLE 3

Life Change Scores for Normals and Counseling Center Clients

Group	Positive Change	Negative Change
	Mean	Mean
Normals (N = 18)	10.55	9.61
Counseling Center Clients (N = 18)	8.33	16.61

From Sarason,Johnson,and Siegel (1978)

TABLE 4

Correlations Between LES Change Scores, Life Change Unit Scores (34 items) and Psychological Screening Inventory Scale Scores

Life Change Score	Psychological Screening Inventory Score	
	Social Non-conformity	Discomfort
LES Positive Change	.02	-.04
LES Negative Change	.26*	.25*
LES Total Change	.18	.12
Life Change Unit Score	.14	.15

* $p < .05$

From Sarason, Johnson, and Siegel (1978)

TABLE 5

Partial Correlations Between Measures of Life Change and Measures of Anxiety, Depression and Hostility in Subjects Differing on the Arousal Seeking Dimension

Arousal Seeking Score	Life Change Measure	Dependent Variables		
		Anxiety	Depression	Hostility
HIGH	Positive Change	-.15	-.23	.05
	Negative Change	-.01	-.04	.05
LOW	Positive Change	-.18	-.12	-.00
	Negative Change	.36*	.23	.46**

* $p < .05$
** $p < .01$

TABLE 6

Partial Correlations Between Positive and Negative Life Change and Measures of Depression and Anxiety for Subjects Differing in Locus of Control Orientation

Locus of Control	Life Change Scores	Dependent Measures		
		Depression	Trait Anxiety	State Anxiety
Internals (N=55)	Positive Change	-.02	-.09	.10
	Negative Change	.10	.15	-.10
Externals (N=66)	Positive Change	-.05	-.11	-.15
	Negative Change	.32*	.31*	.10

* $p < .01$

From Johnson and Sarason (1978)

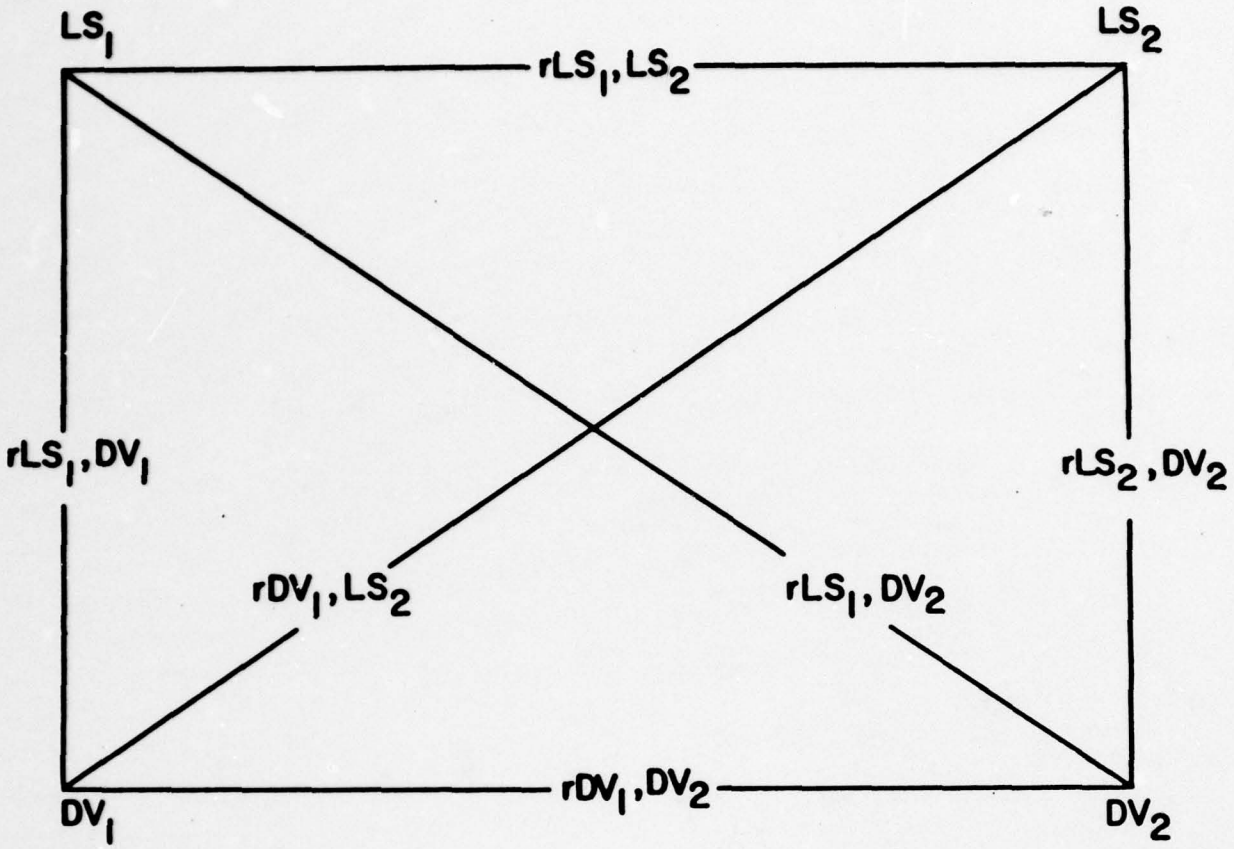
Figure Captions

Figure 1. Cross-lagged Panel Correlational Model.

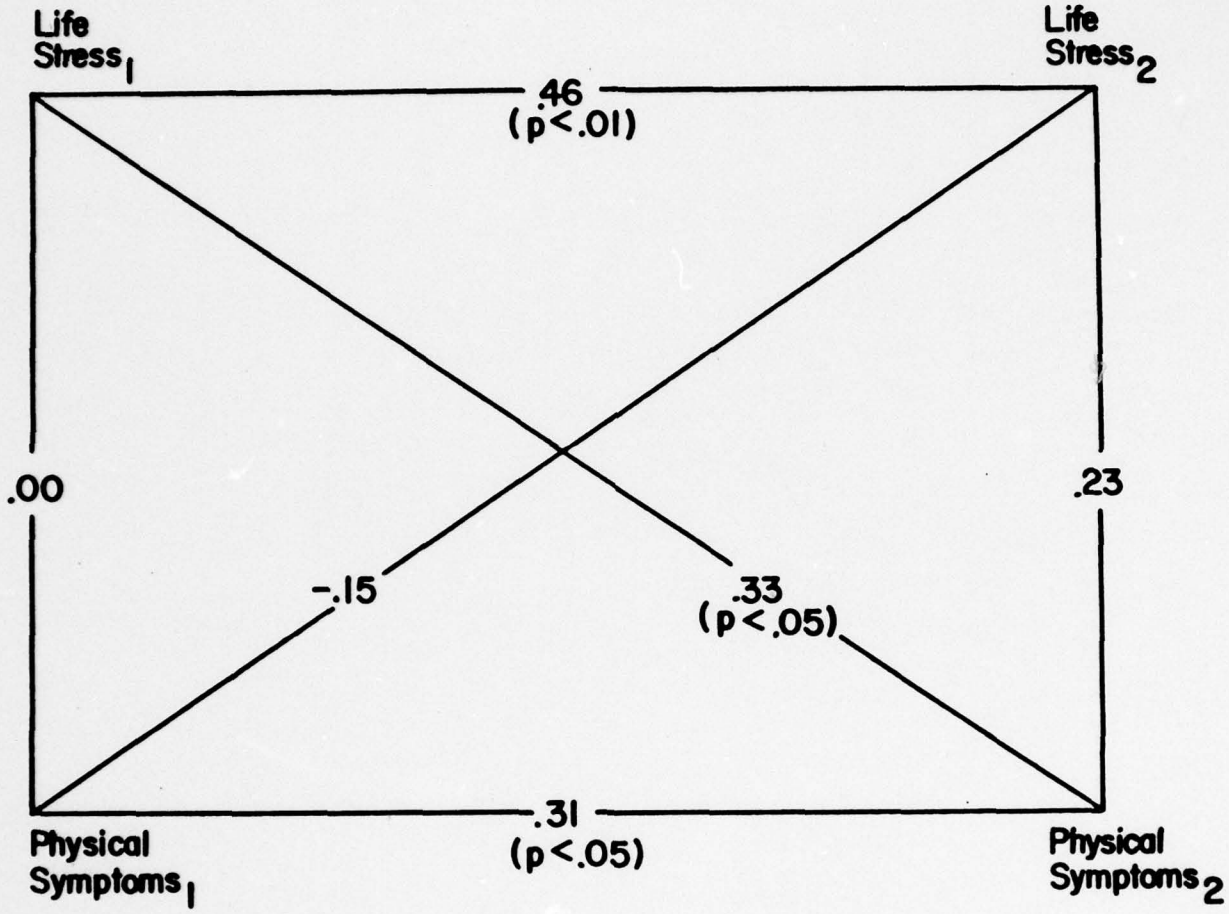
Figure 2. Cross-lagged Correlational Analysis of Measures of Negative Life Change and the Reporting of Physical Symptoms.

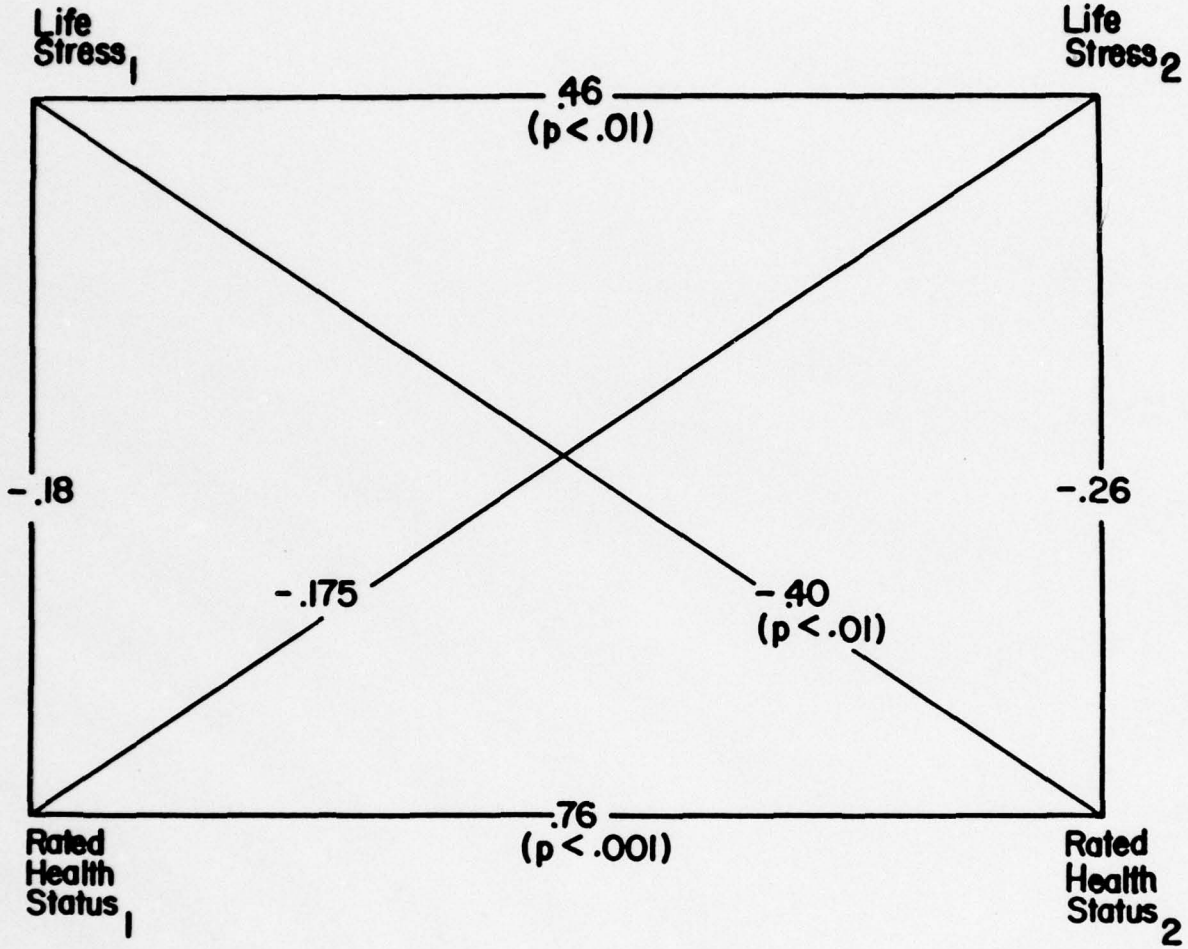
Figure 3. Cross-lagged Correlational Analysis of Measures of Negative Life Change and Ratings of Physical Health.

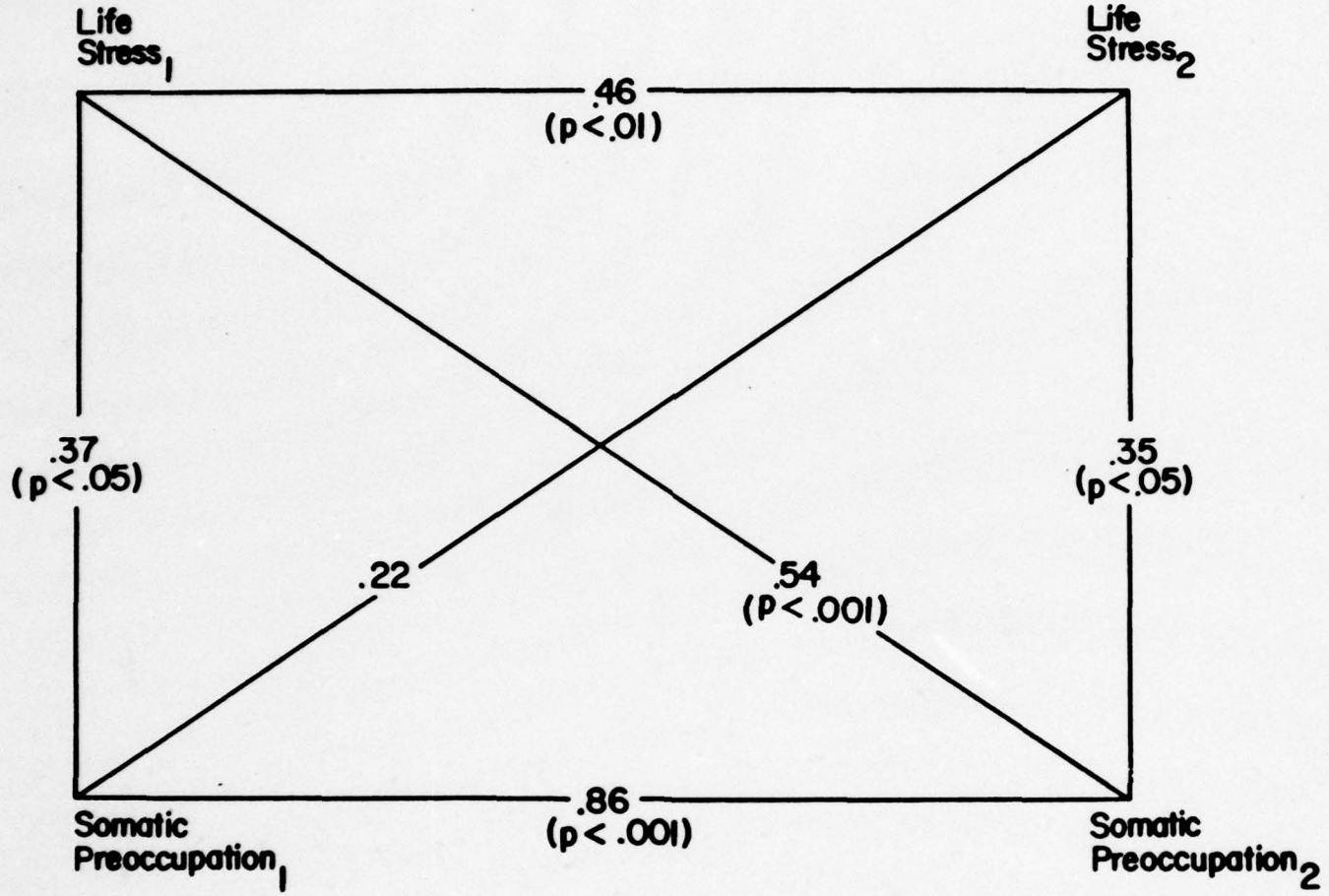
Figure 4. Cross-lagged Correlational Analysis of Measures of Negative Life Change and Somatic Preoccupation.



Note: LS = Life Stress
DV = Dependent Variable


Life Stress 1
Life Stress 2
.46 (p<.01)
.00
.23
-.15
.33 (p<.05)
.31 (p<.05)
Physical Symptoms 1
Physical Symptoms 2


Life Stress 1
Life Stress 2
.46
(p < .01)
-.18
-.26
-.175
-.40
(p < .01)
.76
(p < .001)
Rated Health Status 1
Rated Health Status 2


Life Stress$_1$
Life Stress$_2$
.46 (p<.01)
.37 (p<.05)
.35 (p<.05)
.22
.54 (p<.001)
.86 (p<.001)
Somatic Preoccupation$_1$
Somatic Preoccupation$_2$

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